Volume Contents

NUMBERS 1–2

vii Contributors

ix Foreword

x Acknowledgements

xi 1999 membership of the U.S. National Committee for Theoretical and Applied Mechanics

1 Executive summary

J. D. Achenbach 13 Quantitative nondestructive evaluation

J. R. Barber and **M. Ciavarella** 29 Contact mechanics

D. M. Barnett 45 Bulk, surface, and interfacial waves in anisotropic linear elastic solids

Z. P. Bažant 55 Structural stability

Z. P. Bažant 69 Size effect

W. F. Chen 81 Plasticity, limit analysis and structural design

R. M. Christensen 93 Mechanics of cellular and other low-density materials

R. J. Clifton 105 Response of materials under dynamic loading

P. R. Dawson 115 Computational crystal plasticity

J. P. Dempsey 131 Research trends in ice mechanics

G. J. Dvorak 155 Composite materials: inelastic behavior, damage, fatigue and fracture

F. Erdogan 171 Fracture mechanics

L. B. Freund 185 The mechanics of electronic materials

M. Grigoriu 197 Stochastic Mechanics

R. B. Hetnarski and **J. Ignaczak** 215 Nonclassical dynamical thermoelasticity

J. W. Hutchinson 225 Plasticity at the micron scale

R. D. James 239 New materials from theory: trends in the development of active materials

W. G. Knauss 251 Perspectives in experimental solid mechanics

D. Krajcinovic 267 Damage mechanics: accomplishments, trends and needs

E. Krempl 279 Viscoplastic models for high temperature applications

D. L. McDowell 293 Modeling and experiments in plasticity

R. O. Ritchie, C. J. Gilbert and **J. M. McNaney** 311 Mechanics and mechanisms of fatigue damage and crack growth in advanced materials

A. J. Rosakis and **G. Ravichandran** 331 Dynamic failure mechanics

J. W. Rudnicki 349 Geomechanics

R. A. Schapery 359 Nonlinear viscoelastic solids

Z. Suo 367 Evolving material structures of small feature sizes

E. B. Tadmor, R. Phillips and **M. Ortiz** 379 Hierarchical modeling in the mechanics of materials

J. A. Tichy and **D. M. Meyer** 391 Review of solid mechanics in tribology

T. C. T. Ting 401 Recent developments in anisotropic elasticity

S. Torquato 411 Modeling of physical properties of composite materials

NUMBER 3

S. Lin, H. Garmestani and **B. Adams** 423 The evolution of probability functions in an inelasticly deforming two-phase medium

M. Cho and **H. S. Kim** 435 Iterative free-edge stress analysis of composite laminates under extension, bending, twisting and thermal loadings

A. A. Al-Falou and **R. C. Ball** 461 Crack propagation in heterogeneous media

Y. Y. Kim and **T. S. Kim** 477 Topology optimization of beam cross sections

C. S. Huang, Y. P. Tseng, S. H. Chang and **C. L. Hung** 495 Out-of-plane dynamic analysis of beams with arbitrarily varying curvature and cross-section by dynamic stiffness matrix method

D. M. Stump 515 The hockling of cables: a problem in shearable and extensible rods

B. Popescu and **D. H. Hodges** 535 On asymptotically correct Timoshenko-like anisotropic beam theory

559 Keywords

NUMBER 4

X. J. Zheng, X. Wang and **Y.-H. Zhou** 563 Magnetoelastic analysis of non-circular super-conducting partial torus

X. K. Zhu and **Y. J. Chao** 577 Fully plastic crack-tip fields for CCP and DECP specimens under tension in non-hardening materials

C.-C. Lin, C.-H. Lin and **J. T. S. Wang** 599 On some aspects of pin-loaded laminates

W. L. Chen, A. G. Striz and **C. W. Bert** 627 High-accuracy plane stress and plate elements in the quadrature element method

Y. Lei and **W. Q. Zhu** 649 Fatigue crack growth in degrading elastic components of nonlinear structural systems under random loading

S. Alexandrov and **O. Richmond** 669 On estimating the tensile strength of an adhesive plastic layer of arbitrary simply connected contour

G. Ben-Dor, A. Dubinsky and **T. Elperin** 687 The optimum arrangement of the plates in a multi-layered shield

697 Keywords

NUMBER 5

S. R. Marur and **G. Prathap** 701 Consistency and correctness evaluation of shear deformable anisoparametric formulations

S. S. Vel and **R. C. Batra** 715 The generalized plane strain deformations of thick anisotropic composite laminated plates

S. Govindjee and **G. J. Hall** 735 A computational model for shape memory alloys

T. D. Chaudhari and **S. K. Maiti** 761 A study of vibration of geometrically segmented beams with and without crack

O. Kolednik 781 The yield stress gradient effect in inhomogeneous materials

Y. C. Shiah and **C. L. Tan** 809 Determination of interior point stresses in two dimensional BEM thermoelastic analysis of anisotropic bodies

831 Keywords

NUMBER 6

X. Z. Suo, M. P. Valeta, B. Drubay, B. Martelet and **H. Deschanels** 835 Energy release rate along any crack front in the thickness direction of shell elements

A. V. Dyskin, L. N. Germanovich and **K. B. Ustinov** 857 Asymptotic analysis of crack interaction with free boundary

W. Luo, T. Yang, Z. Li and **L. Yuan** 887 Experimental studies on the temperature fluctuations in deformed thermoplastics with defects

A. K. Soh 899 Development of special multi-material elements

G. Camus 919 Modelling of the mechanical behavior and damage processes of fibrous ceramic matrix composites: application to a 2-D SiC/SiC

E. Pan and **F. Tonon** 943 Three-dimensional Green's functions in anisotropic piezoelectric solids

959 Announcement

965 Keywords

NUMBER 7

F. Ubertini 969 A contribution to the analysis of flexible link systems

J. M. Mínguez 991 Study of the fracture toughness by finite element methods

A. Anthoine 1003 Effect of couple-stresses on the elastic bending of beams

O. Rappel and **O. Rand** 1019 Analysis of elastically coupled thick-walled composite blades

M. Schulze and **W. D. Nix** 1045 Finite element analysis of the wedge delamination test

P. Lu, M. J. Tan and **K. M. Liew** 1065 A further investigation of Green's functions for a piezoelectric material with a cavity or a crack

V. V. Moshev and **L. L. Kozhevnikova** 1079 Predictive potentialities of a cylindrical structural cell for particulate elastomeric composites

1099 Keywords

NUMBER 8

M. A. D. Rosa and **C. Franciosi** 1103 Exact and approximate dynamic analysis of circular arches using DQM

M. Rahman 1119 The Reissner–Sagoci problem for a half-space under buried torsional force

K. C. Leurer and **J. Dvorkin** 1133 Intergranular squirt flow in sand: grains with viscous cement

S.-J. Kim 1145 A one-dimensional continuum model for thermo-electric phase transformations in ferroelectrics

W. Liu and **X. Markenscoff** 1165 The Cosserat spectrum for cylindrical geometries (Part 1: discrete subspace)

W. Liu and **X. Markenscoff** 1177 The Cosserat spectrum for cylindrical geometries (Part 2: $\tilde{u}^{-1}$ subspace and applications)

M. A. Wadee 1191 Effects of periodic and localized imperfections on struts on nonlinear foundations and compression sandwich panels

X. Zheng, J. R. Booker and **J. P. Carter** 1211 Limit analysis of the bearing capacity of fissured materials

1245 Announcement

1247 Keywords

NUMBER 9

B. L. Wang, J. C. Han and **S. Y. Du** 1251 Cracks problem for non-homogeneous composite material subjected to dynamic loading

Y. Wu, Z. Ling and **Z. Dong** 1275 Stress–strain fields and the effectiveness shear properties for three-phase composites with imperfect interface

H.-J. Ding, F.-L. Guo, P.-F. Hou and **D.-Q. Zou** 1293 On the equilibrium of piezoelectric bodies of revolution

R. I. Más and **F. I. Mas** 1327 Elastic interaction graphs for steel H-sections subjected to bending, shear and axial forces

Q. S. Li 1339 Vibration analysis of flexural-shear plates with varying cross-section

Y.-M. Wang 1361 The transient dynamics of a cable-mass system due to the motion of an attached accelerating mass

1385 Keywords

NUMBER 10

C. Li and **F. Ellyin** 1389 A mesomechanical approach to inhomogeneous particulate composite undergoing localized damage: part II—theory and application

D. Liu and **W. J. Stronge** 1403 Ballistic limit of metal plates struck by blunt deformable missiles: experiments

E. L. Axelrad 1425 Shell theory and its specialized branches

L. Wu and **S. Du** 1453 A rigid line in a confocal elliptic piezoelectric inhomogeneity embedded in an infinite piezoelectric medium

M. Jie and **T. X. Yu** 1471 Analytical modelling of dynamic plastic buckling of an axially loaded strain-rate sensitive bar

D. Zhou, Y. K. Cheung and **J. Kong** 1483 Free vibration of thick, layered rectangular plates with point supports by finite layer method

H. Luo and **S. Hanagud** 1501 Dynamics of delaminated beams

1521 Keywords

NUMBER 11

R. D. Kangwai and **S. D. Guest** 1525 Symmetry-adapted equilibrium matrices

X.-W. Gao and **T. G. Davies** 1549 3D multi-region BEM with corners and edges

B. Wu 1561 Direct calculation of buckling strength of imperfect structures

M. Cherkaoui, Q. P. Sun and **G. Q. Song** 1577 Micromechanics modeling of composite with ductile matrix and shape memory alloy reinforcement

J.-B. Leblond and **J. Frelat** 1595 Crack kinking from an initially closed crack

P. Betsch and **P. Steinmann** 1615 Derivation of the fourth-order tangent operator based on a generalized eigenvalue problem

Y. Z. Chen 1629 Closed form solutions of T-stress in plane elasticity crack problems

C. H. Daros and **H. Antes** 1639 Dynamic fundamental solutions for transversely isotropic piezoelectric materials of crystal class 6 mm

1659 Keywords

NUMBER 12

Y.-H. Zhou and **H. S. Tzou** 1663 Active control of nonlinear piezoelectric circular shallow spherical shells

D. Jia, A. M. Lennon and **K. T. Ramesh** 1679 High-strain-rate pressure-shear recovery: a new experimental technique

H. Taweel, S. B. Dong and **M. Kazic** 1701 Wave reflection from the free end of a cylinder with an arbitrary cross-section

W. Łatas and **M. Życzkowski** 1727 Decohesive carrying capacity of a disk under tension and in-plane torsion

F.-L. Liu 1743 Rectangular thick plates on winkler foundation: differential quadrature element solution

T. J. Vogler, S.-Y. Hsu and **S. Kyriakides** 1765 Composite failure under combined compression and shear

P. W. Fowler and **S. D. Guest** 1793 A symmetry extension of Maxwell's rule for rigidity of frames

1805 Keywords

NUMBER 13

K. Yu. Volokh and **O. Vilnay** 1809 Why pre-tensioning stiffens cable systems

F. I. Niordson 1817 An asymptotic theory for circular cylindrical shells

M. B. Rubin, O. Yu. Vorobiev and **L. A. Glenn** 1841 Mechanical and numerical modeling of a porous elastic–viscoplastic material with tensile failure

P. Rahulkumar, A. Jagota, S. J. Bennison and **S. Saigal** 1873 Cohesive element modeling of viscoelastic fracture: application to peel testing of polymers

Y. A. Antipov, S. T. Kolaczkowski, A. B. Movchan and **A. Spence** 1899 Asymptotic analysis for cracks in a catalytic monolith combustor

H. X. Zhu and **N. J. Mills** 1931 The in-plane non-linear compression of regular honeycombs

1951 Keywords

NUMBER 14

A. Abdul-Latif 1955 On the lateral collapse of an identical pair of cylinders

M. Ekh and **K. Runesson** 1975 Bifurcation results for plasticity coupled to damage with MCR-effect

Y. H. Jang 1997 Transient thermoelastic contact problems for an elastic foundation

D. Karagiozova and **N. Jones** 2005 Dynamic elastic–plastic buckling of circular cylindrical shells under axial impact

R. Jain, K. Ramachandra and **K. R. Y. Simha** 2035 Singularity in rotating orthotropic discs and shells

G. A. Rogerson and **K. J. Sandiford** 2059 The effect of finite primary deformations on harmonic waves in layered elastic media

2089 Keywords

NUMBER 15

Y. A. Antipov 2093 Galin's problem for a periodic system of stamps with friction and adhesion

Z.-Q. Cheng, L.-H. He and **S. Kitipornchai** 2127 Influence of imperfect interfaces on bending and vibration of laminated composite shells

S. Q. Nusier and **G. M. Newaz** 2151 Growth of interfacial cracks in a TBC/superalloy system due to oxide volume induced internal pressure and thermal loading

H. Yang and **X. Guo** 2167 Perturbation boundary–finite element combined method for solving the linear creep problem

S. A. Elaskar, L. A. Godoy, D. D. Gray and **J. M. Stiles** 2185 A viscoplastic approach to model the flow of granular solids

E. N. Kuznetsov 2215 On the evaluation of statical-kinematic stiffness matrix for underconstrained structural systems

2225 Keywords

NUMBER 16

E. Suhir 2229 Adhesively bonded assemblies with identical non-deformable adherends and 'piecewise continuous' adhesive layer: predicted thermal stresses in the adhesive

Z.-Q. Cheng and **S. Kitipornchai** 2253 Exact eigenvalue correspondences between laminated plate theories via membrane vibration

N. J. Sørensen and **L. B. Freund** 2265 Unstable neck formation in a ductile ring subjected to impulsive radial loading

K. Terada, M. Hori, T. Kyoya and **N. Kikuchi** 2285 Simulation of the multi-scale convergence in computational homogenization approaches

Z. H. Zhu and **S. A. Meguid** 2313 On the thermoelastic stresses of multiple interacting inhomogeneities

Wei-qiu Chen 2331 On piezoelastic contact problem for a smooth punch

R. Paskaramoorthy and **S. A. Meguid** 2341 On the dynamic behaviour of porous materials

2359 Keywords

NUMBER 17

Y. Rabin and **P. S. Steif** 2363 Thermal stress modeling in cryosurgery

M. Mofid and **A. Yavari** 2377 On the kern of a general cross section

K. Niu and **R. Talreja** 2405 Modeling of compressive failure in fiber reinforced composites

E. D. Reedy Jr. 2429 Connection between interface corner and interfacial fracture analyses of an adhesively-bonded butt joint

M. Dauge and **Z. Yosibash** 2443 Boundary layer realization in thin elastic three-dimensional domains and two-dimensional Hierarchic plate models

J. R. Yeh and **M. Kulak** 2473 Fracture analysis of cracked orthotropic skin panels with riveted stiffeners

2489 Erratum

2491 Keywords

NUMBER 18

S. Q. Nusier, G. M. Newaz and **Z. A. Chaudhury** 2495 Experimental and analytical evaluation of damage processes in thermal barrier coatings

B. K. Lee and **S. J. Oh** 2507 Elastica and buckling load of simple tapered columns with constant volume

J. A. C. Martins and **A. Pinto da Costa** 2519 Stability of finite-dimensional nonlinear elastic systems with unilateral contact and friction

A. I. Leonov 2565 On the conditions of potentiality in finite elasticity and hypo-elasticity

H.-F. Tan, Z.-H. Tian and **X.-W. Du** 2577 A new geometrical nonlinear laminated theory for large deformation analysis

T. Chen and **Q.-S. Zheng** 2591 Universal connections of elastic fibrous composites: some new results

W. Q. Chen and **T. Shioya** 2603 Complete and exact solutions of a penny-shaped crack in a piezoelectric solid: antisymmetric shear loadings

2621 Keywords

NUMBER 19

X. Ruan, S. C. Danforth, A. Safari and **T.-W. Chou** 2625 Saint-Venant end effects in piezoceramic materials

A. R. Shahani and **S. Adibnazari** 2639 Analysis of perfectly bonded wedges and bonded wedges with an interfacial crack under antiplane shear loading

D. Leguillon and **R. Abdelmoula** 2651 Mode III near and far fields for a crack lying in or along a joint

G. A. Abu-Farsakh, S. A. Barakat and **N. R. Al-Zoubi** 2673 Effect of material nonlinearity in unidirectional composites on the behavior of beam structures

J. Lellep and **E. Puman** 2695 Optimization of plastic conical shells loaded by a rigid central boss

W. H. Warner 2709 Optimal design of elastic rods under axial gravitational load using the maximum principle

X.-L. Gao and **R. E. Rowlands** 2727 Hybrid method for stress analysis of finite three-dimensional elastic components

2753 Keywords

NUMBER 20

N. A. Fleck, D. Liu and **J. Y. Shu** 2757 Microbuckle initiation from a hole and from the free edge of a fibre composite

M. Negahban 2777 Modeling the thermomechanical effects of crystallization in natural rubber: I. The theoretical structure

M. Negahban 2791 Modeling the thermomechanical effects of crystallization in natural rubber: II. Elementary thermodynamic properties

M. Negahban 2811 Modeling the thermomechanical effects of crystallization in natural rubber: III. Mechanical properties

P. E. Barbone, A. Cherukuri and **D. Goldman** 2825 Canonical representations of complex vibratory subsystems: time domain Dirichlet to Neumann maps

M. A. Irfan and **V. Prakash** 2859 Time resolved friction during dry sliding of metal on metal

2883 Keywords

NUMBER 21

X. W. Xu, H. C. Man and **T. M. Yue** 2887 Strength prediction of composite laminates with multiple elliptical holes

D. Rittel 2901 Experimental investigation of transient thermoplastic effects in dynamic fracture

Y. P. Arramon, M. M. Mehrabadi, D. W. Martin and **S. C. Cowin** 2915 A multidimensional anisotropic strength criterion based on Kelvin modes

E. N. Kuznetsov 2937 On the physical realizability of singular structural systems

P. F. Pai, T. J. Anderson and **E. A. Wheater** 2951 Large-deformation tests and total-Lagrangian finite-element analyses of flexible beams

T.-L. Wu and **J. H. Huang** 2981 Closed-form solutions for the magnetoelectric coupling coefficients in fibrous composites with piezoelectric and piezomagnetic phases

3011 Keywords

NUMBER 22

M. K. Wadee, Y. Higuchi and **G. W. Hunt** 3015 Galerkin approximations to static and dynamic localization problems

W. Lawton, R. Raghavan, S. R. Ranjan and **R. R. Viswanathan** 3031 Tubes in tubes: catheter navigation in blood vessels and its applications

D. Tan 3055 Torsional buckling analysis of thin and thick shells of revolution

S. R. Chowdhury and **R. Narasimhan** 3079 A finite element analysis of stationary crack tip fields in a pressure sensitive constrained ductile layer

Z. Cai and **Y. Fu** 3101 Exact and asymptotic stability analyses of a coated elastic half-space

G. Borino 3121 Consistent shakedown theorems for materials with temperature dependent yield functions

3149 Keywords

NUMBER 23

Z.-Q. Cheng, C. W. Lim and **S. Kitipornchai** 3153 Three-dimensional asymptotic approach to inhomogeneous and laminated piezoelectric plates

V. A. Buryachenko and **F. G. Rammerstorfer** 3177 On the thermo-elasto-statics of composites with coated randomly distributed inclusions

H.-J. Ding, P.-F. Hou and **F.-L. Guo** 3201 The elastic and electric fields for three-dimensional contact for transversely isotropic piezoelectric materials

X. D. Wang and **S. A. Meguid** 3231 On the electroelastic behaviour of a thin piezoelectric actuator attached to an infinite host structure

X.-L. Xu and **R. K. N. D. Rajapakse** 3253 On singularities in composite piezoelectric wedges and junctions

3277 Keywords

NUMBER 24

G. Z. Voyiadjis and **A. Zolochevsky** 3281 Thermodynamic modeling of creep damage in materials with different properties in tension and compression

C. Y. Wang and **Y. M. Xia** 3305 Validity of one-dimensional experimental principle for flat specimen in bar–bar tensile impact apparatus

Z. Kolakowski and **A. Teter** 3323 Interactive buckling of thin-walled beam-columns with intermediate stiffeners or/and variable thickness

F. M. Borodich 3345 Some contact problems of anisotropic elastodynamics: integral characteristics and exact solutions

A. A. Caiazzo and **F. Costanzo** 3375 On the constitutive relations of materials with evolving microstructure due to microcracking

3399 Keywords

NUMBER 25

Y. V. Mikhlin and **A. M. Volok** 3403 Solitary transversal waves and vibro-impact motions in infinite chains and rods

A. Dall'Asta 3421 Dynamics of elastic bodies prestressed by internal slipping cables

P. M. Reddy and **M. Tajuddin** 3439 Exact analysis of the plane-strain vibrations of thick-walled hollow poroelastic cylinders

L. Rosati 3457 A novel approach to the solution of the tensor equation $AX + XA = H$

S. Lee and **W. G. Knauss** 3479 Failure of laminated composites at thickness discontinuities under complex loading and elevated temperatures

H. Altenbach 3503 An alternative determination of transverse shear stiffnesses for sandwich and laminated plates

3521 Keywords

NUMBER 26

L. Shen and **S. Yi** 3525 New solutions for effective elastic moduli of micro-cracked solids

Y.-M. Wang, J.-Q. Tarn and **C.-K. Hsu** 3535 State space approach for stress decay in laminates

L. M. Brock 3555 Effects of crack surface convection for rapid crack growth in a thermoelastic solid

T. J. Stratford and **C. J. Burgoyne** 3569 The toppling of hanging beams

M. A. Sutton, X. Deng, F. Ma, J. C. Newman Jr. and **M. James** 3591 Development and application of a crack tip opening displacement-based mixed mode fracture criterion

F. Krasucki and **S. Lenci** 3619 Analysis of interfaces of variable stiffness

P. Haupt, A. Lion and **E. Backhaus** 3633 On the dynamic behaviour of polymers under finite strains: constitutive modelling and identification of parameters

3647 Keywords

NUMBER 27

Q. M. Li 3651 Continuity conditions at bending and shearing interfaces of rigid, perfectly plastic structural elements

E. Honein, T. Honein and **G. Herrmann** 3667 Energetics of two circular inclusions in anti-plane elastostatics

A. Barut, E. Madenci and **A. Tessler** 3681 Nonlinear thermoelastic analysis of composite panels under non-uniform temperature distribution

H. Li, J. Lambros, B. A. Cheeseman and **M. H. Santare** 3715 Experimental investigation of the quasi-static fracture of functionally graded materials

A. Pandolfi, P. R. Guduru, M. Ortiz and **A. J. Rosakis** 3733 Three dimensional cohesive-element analysis and experiments of dynamic fracture in C300 steel

3761 Letters to the editor

3771 Keywords

NUMBER 28

L. Szabó 3775 Comments on loss of strong ellipticity in elastoplasticity

N. Vassart, R. Laporte and **R. Motro** 3807 Determination of mechanism's order for kinematically and statically indetermined systems

W. Dreyer and **W. H. Müller** 3841 A study of the coarsening in tin/lead solders

N. D. Aparicio 3873 Elastic complex analysis and its applications in fracture mechanics

3897 Keywords

NUMBER 29

M. Froli and **G. Royer-Carfagni** 3901 A mechanical model for the elastic–plastic behavior of metallic bars

E. J. Barbero, E. K. Dede and **S. Jones** 3919 Experimental verification of buckling-mode interaction in intermediate-length composite columns

M. Cuomo and **L. Contrafatto** 3935 Stress rate formulation for elastoplastic models with internal variables based on augmented Lagrangian regularisation

D. D. Milašinović 3965 Rheological–dynamical analogy: prediction of buckling curves of columns

F. Martinet and **P. Chabrand** 4005 Application of ALE finite elements method to a lubricated friction model in sheet metal forming

4033 Letters to the editor

4039 Keywords

NUMBER 30

W. H. Tong, J. S. Jiang and **G. R. Liu** 4043 Solution existence of the optimization problem of truss structures with frequency constraints

P. Steinmann and **P. Betsch** 4061 A localization capturing FE-interface based on regularized strong discontinuities at large inelastic strains

M. Åberg and **P. Gudmundson** 4083 Micromechanical modeling of transient waves from matrix cracking and fiber fracture in laminated beams

Y. Cho and **J. L. Rose** 4103 An elastodynamic hybrid boundary element study for elastic guided wave interactions with a surface breaking defect

M. Seitzberger, F. G. Rammerstorfer, R. Gradinger, H. P. Degischer, M. Blaimschein and **C. Walch** 4125 Experimental studies on the quasi-static axial crushing of steel columns filled with aluminium foam

J. Aboudi and **T. O. Williams** 4149 A coupled micro–macromechanical analysis of hygrothermoelastic composites

4181 Keywords

4184 Announcement

NUMBER 31

V. A. Buryachenko 4185 Internal residual stresses in elastically homogeneous solids: I. Statistically homogeneous stress fluctuations

V. A. Buryachenko 4211 Internal residual stresses in elastically homogeneous solids: II. Stress fluctuations near a crack tip and effective energy release rate

S. Lenci and **G. Menditto** 4239 Weak interface in long fiber composites

J. Wang, J. Fang and **B. L. Karihaloo** 4261 Asymptotics of multiple crack interactions and prediction of effective modulus

R. H. Plaut, J. K. S. Goh, M. Kigudde and **D. C. Hammerand** 4275 Shell analysis of an inflatable arch subjected to snow and wind loading

X.-P. Shu and **K. P. Soldatos** 4289 Cylindrical bending of angle-ply laminates subjected to different sets of edge boundary conditions

4309 Letters to the Editor

4315 Keywords

NUMBER 32

Y. C. Gao and **T. J. Gao** 4319 Large deformation contact of a rubber notch with a rigid wedge

A. D. Kerr 4335 On the determination of the rail support modulus k

R. Pavazza 4353 An approximate solution for thin rectangular orthotropic/isotropic strips under tension by line loads

Y. Ootao and **Y. Tanigawa** 4377 Three-dimensional transient piezothermoelasticity in functionally graded rectangular plate bonded to a piezoelectric plate

U. Lee and **J. Kim** 4403 Dynamics of elastic-piezoelectric two-layer beams using spectral element method

T. L. Warren and **M. R. Tabbara** 4419 Simulations of the penetration of 6061-T6511 aluminum targets by spherical-nosed VAR 4340 steel projectiles

F. Pierron, S. Zhavoronok and **M. Grédiac** 4437 Identification of the through-thickness properties of thick laminated tubes using the virtual fields method

E. J. Sapountzakis and **J. T. Katsikadelis** 4455 Interface forces in composite steel–concrete structure

4473 Keywords

NUMBER 33

M. A. Irfan and **V. Prakash** 4477 Dynamic deformation and fracture behavior of novel damage tolerant discontinuously reinforced aluminum composites

P. Mandal and **C. R. Calladine** 4509 Buckling of thin cylindrical shells under axial compression

V. A. Gotlib, T. Sato and **A. I. Beltzer** 4527 Neural computations of effective response of random composites

Q. M. Li 4539 Energy correlations between a damaged macroscopic continuum and its sub-scale

H. Shen, P. Schiavone, C. Q. Ru and **A. Mioduchowski** 4557 An elliptic inclusion with imperfect interface in anti-plane shear

C. H. Wang, L. R. F. Rose, R. Callinan and **A. A. Baker** 4577 Thermal stresses in a plate with a circular reinforcement

M. Ristinmaa and **N. S. Ottosen** 4601 Consequences of dynamic yield surface in viscoplasticity

4623 Letters to the Editor

4631 Keywords

NUMBER 34

C.-K. Chao and **B. Gao** 4635 Rigid stamp indentation for a thermoelastic half-plane

A. M. Karlsson and **W. J. Bottega** 4655 On thermal buckling of patched beam-plates

J. Stabler and **G. Baker** 4691 On the form of free energy and specific heat in coupled thermo-elasticity with isotropic damage

G.-D. Jung, S.-K. Youn and **B.-K. Kim** 4715 A three-dimensional nonlinear viscoelastic constitutive model of solid propellant

4733 Keywords

NUMBER 35

H. Koguchi and **T. Muramoto** 4737 The order of stress singularity near the vertex in three-dimensional joints

J. Cheng, B. Wang and **S. Du** 4763 A statistical model for predicting effective electroelastic properties of polycrystalline ferroelectric ceramics with aligned defects

L.-J. Young and **Y.-P. Tsai** 4783 A detailed study of rough edge crack with worn asperities

Y.-M. Yi, S.-H. Park and **S.-K. Youn** 4791 Design of microstructures of viscoelastic composites for optimal damping characteristics

J.-H. Kang and **A. W. Leissa** 4811 Three-dimensional vibrations of thick spherical shell segments with variable thickness

M. Ryvkin 4825 *K*-Dominance zone for a semi-infinite mode I crack in a sandwich composite

K.-C. Wu 4841 On an elliptic crack embedded in an anisotropic material

S. M. Kwon and **K. Y. Lee** 4859 Analysis of stress and electric fields in a rectangular piezoelectric body with a center crack under anti-plane shear loading

NUMBER 36

S. J. Oh, B. K. Lee and **I. W. Lee** 4871 Free vibrations of non-circular arches with non-uniform cross-section

H. D. Espinosa, N. S. Brar, G. Yuan, Y. Xu and **V. Arrieta** 4893 Enhanced ballistic performance of confined multi-layered ceramic targets against long rod penetrators through interface defeat

M. Tabaddor 4915 Influence of nonlinear boundary conditions on the single-mode response of a cantilever beam

H. Fang, J. Yang and **Q. Jiang** 4933 Rotation-perturbed surface acoustic waves propagating in piezoelectric crystals

H.-J. Lee and **D. A. Saravanos** 4949 A mixed multi-field finite element formulation for thermopiezoelectric composite shells

C.-F. Gao and **M.-Z. Wang** 4969 Collinear permeable cracks between dissimilar piezoelectric materials

X.-W. Gao and **T. G. Davies** 4987 An effective boundary element algorithm for 2D and 3D elastoplastic problems

R. Peek 5009 An incrementally continuous deformation theory of plasticity with unloading

5033 Keywords

NUMBER 37

M. Kuroda and **V. Tvergaard** 5037 Forming limit diagrams for anisotropic metal sheets with different yield criteria

P. S. Theocaris and **D. P. Sokolis** 5061 Splitting the elastic strain energy in thin plates of a transversely isotropic material

A. A. Al-Falou and **R. C. Ball** 5079 The 3-D weight functions for a quasi-static planar crack

H. Gan, C. E. Orozco and **C. T. Herakovich** 5097 A strain-compatible method for micromechanical analysis of multi-phase composites

Q. S. Li 5123 A new exact approach for determining natural frequencies and mode shapes of non-uniform shear beams with arbitrary distribution of mass or stiffness

T. Chen, C.-T. Chung and **W.-L. Lin** 5143 A revisit of a cylindrically anisotropic tube subjected to pressuring, shearing, torsion, extension and a uniform temperature change

L.-P. Chao and **J. H. Huang** 5161 On a piezoelectric material containing a permeable elliptical crack

P. H. Wen, M. H. Aliabadi and **A. Young** 5177 A boundary element method for dynamic plate bending problems

Y. J. Xie 5189 An analytical method on circumferential periodic cracked pipes and shells

M. Iura and **J. Kanaizuka** 5203 Flexible translational joint analysis by meshless method

NUMBER 38

B. L. Wang, J. C. Han and **S. Y. Du** 5219 Electroelastic fracture dynamics for multilayered piezoelectric materials under dynamic anti-plane shearing

B.-Z. Gai 5233 Interaction of elastic waves with the unilateral interface between a layer and a half-space

K. Farahani and **R. Naghdabadi** 5247 Conjugate stresses of the Seth–Hill strain tensors

W.-L. Yin 5257 Deconstructing plane anisotropic elasticity Part I: The latent structure of Lekhnitskii's formalism

W.-L. Yin 5277 Deconstructing plane anisotropic elasticity Part II: Stroh's formalism sans frills

H. Hao, H. K. Cheong and **S. Cui** 5297 Analysis of imperfect column buckling under intermediate velocity impact

S. Yi and **S. Gao** 5315 Fracture toughening mechanism of shape memory alloys due to martensite transformation

E. Pan and **F. G. Yuan** 5329 Three-dimensional Green's functions in anisotropic bimaterials

P. R. Marur and **H. V. Tippur** 5353 Numerical analysis of crack-tip fields in functionally graded materials with a crack normal to the elastic gradient

G. Y. Bagdasarian and **D. J. Hasanian** 5371 Magnetoelastic interaction between a soft ferromagnetic elastic half-plane with a crack and a constant magnetic field

NUMBER 39

S. Hao, K.-H. Schwalbe and **A. Cornec** 5385 The effect of yield strength mis-match on the fracture analysis of welded joints: slip-line field solutions for pure bending

K. Dovstam 5413 Simulation of damped vibrations based on augmented Hooke's law and elastic modes of vibration

H. E. Pettermann and **S. Suresh** 5447 A comprehensive unit cell model: a study of coupled effects in piezoelectric 1–3 composites

T.-Y. Zhang, C.-F. Qian, T. Wang and P. Tong 5465 Interaction of an edge dislocation with a thin-film-covered crack

L. Humbert, V. Valle and M. Cottron 5493 Experimental determination and empirical representation of out-of-plane displacements in a cracked elastic plate loaded in mode I

F. M. Detinko 5505 On the elastic stability of uniform beams and circular arches under nonconservative loading

A. Acharya 5517 A nonlinear generalization of the Koiter–Sanders–Budiansky bending strain measure

Y. Y. Kim and G. H. Yoon 5529 Multi-resolution multi-scale topology optimization – a new paradigm

Q.-H. Qin 5561 General solutions for thermopiezoelectrics with various holes under thermal loading

J. Y. Li 5579 Thermoelastic behavior of composites with functionally graded interphase: a multi-inclusion model

NUMBER 40

S. Li 5599 The micromechanics theory of classical plates: a congruous estimate of overall elastic stiffness

R. Gallego and J. Suarez 5629 Solution of inverse problems by boundary integral equations without residual minimization

J. Wang, J.-D. Yu, Y.-K. Yong and T. Imai 5653 A new theory for electroded piezoelectric plates and its finite element application for the forced vibrations of quartz crystal resonators

A. Yavari, S. Sarkani and E. T. Moyer Jr. 5675 On applications of generalized functions to beam bending problems

K. T. Chau and X. X. Wei 5707 Finite solid circular cylinders subjected to arbitrary surface load. Part I – Analytic solution

X. X. Wei and K. T. Chau 5733 Finite solid circular cylinders subjected to arbitrary surface load. Part II – Application to double-punch test

V. Sokolinsky and Y. Frostig 5745 Branching behavior in the nonlinear response of sandwich panels with a transversely flexible core

E. Rizzi, E. Papa and A. Corigliano 5773 Mechanical behavior of a syntactic foam: experiments and modeling

X. Wang and S. Yu 5795 Transient response of a crack in piezoelectric strip subjected to the mechanical and electrical impacts: mode-III problem

5809 Keywords

5812 Announcement

NUMBER 41

C.-F. Liu, J.-F. Lee and **Y.-T. Lee**	5813	Axisymmetric vibration analysis of rotating annular plates by a 3D finite element
T. R. Kane and **D. A. Levinson**	5829	Locomotion of snakes: a mechanical 'explanation'
C. P. Providakis	5839	Transient boundary element algorithm for elasto-plastic building floor slab analysis
X. Xin and **Z. Chen**	5855	An analytical solution with local elastoplastic models for the evolution of dynamic softening
T. J. Van Dyke and **A. Hoger**	5873	A comparison of second-order constitutive theories for hyperelastic materials
I. Tsukrov and **M. Kachanov**	5919	Effective moduli of an anisotropic material with elliptical holes of arbitrary orientational distribution
Z. Zhong, Q. P. Sun and **P. Tong**	5943	On the elastic axisymmetric deformation of a rod containing a single cylindrical inclusion
C. Hwu and **Y. C. Liang**	5957	Evaluation of stress concentration factors and stress intensity factors from remote boundary data
Z. Q. Qian, A. R. Akisanya and **M. S. Imbabi**	5973	Edge effects in the failure of elastic/viscoelastic joints subjected to surface tractions
M. X. Shi, Y. Huang, H. Gao and **K. C. Hwang**	5995	Non-existence of separable crack tip field in mechanism-based strain gradient plasticity

NUMBER 42

P. N. Poulsen and **L. Damkilde**	6011	Limit state analysis of reinforced concrete plates subjected to in-plane forces
T. C. Wang	6031	Analysis of strip electric saturation model of crack problem in piezoelectric materials
Z. T. Chen and **S. A. Meguid**	6051	The transient response of a piezoelectric strip with a vertical crack under electromechanical impact load
R. van Dijk, F. van Keulen and **J. C. Sterk**	6063	Simulation of closed thin-walled structures partially filled with fluid
D. Shia and **C. Y. Hui**	6085	A Monte Carlo solution method for linear elasticity
Ch. Zhang	6107	Transient elastodynamic antiplane crack analysis of anisotropic solids
S. Kapuria and **P. C. Dumir**	6131	Coupled FSDT for piezothermoelectric hybrid rectangular plate
L. Z. Jiang	6155	Integral representation and Green's functions for 3D time-dependent thermo-piezoelectricity
	6173	Letters to the Editor

NUMBER 43

M. A. Zikry, M. R. Pothier and **J. N. Baucom** 6177 High strain-rate shear-strain localization in f.c.c. crystalline materials: a perturbation analysis

S. Murakami, T. Hirano and **Y. Liu** 6203 Asymptotic fields of stress and damage of a mode I creep crack in steady-state growth

J. Wang, J. Fang and **B. L. Karihaloo** 6221 Asymptotic bounds on overall moduli of cracked bodies

D. Bruno and **F. Greco** 6239 An asymptotic analysis of delamination buckling and growth in layered plates

S. V. Shmegera 6277 The initial boundary-value mixed problems for elastic half-plane with the conditions of contact friction

X. Zhang and **Y.-W. Mai** 6297 Asymptotic fields for dynamic crack growth in pressure-sensitive elastic–plastic materials

Q. M. Li, R. A. W. Mines and **R. S. Birch** 6321 The crush behaviour of Rohacell-51WF structural foam

S. Krenk 6343 Characteristic state plasticity for granular materials Part I: Basic theory

A. Ahadi and **S. Krenk** 6361 Characteristic state plasticity for granular materials Part II: Model calibration and results

6381 Corrigendum

NUMBER 44

H. A. Bruck 6383 A one-dimensional model for designing functionally graded materials to manage stress waves

J. P. Cusumano and **A. Chatterjee** 6397 Steps towards a qualitative dynamics of damage evolution

Y. Z. Povstenko and **O. A. Matkovskii** 6419 Circular disclination loops in nonlocal elasticity

A. Azhdari, M. Obata and **S. Nemat-Nasser** 6433 Alternative solution methods for crack problems in plane anisotropic elasticity, with examples

H. Gu, A. Chattopadhyay, J. Li and **X. Zhou** 6479 A higher order temperature theory for coupled thermo-piezoelectric-mechanical modeling of smart composites

N. Huber, I. Tsagrakis and **C. Tsakmakis** 6499 Determination of constitutive properties of thin metallic films on substrates by spherical indentation using neural networks

N. Takano, Y. Ohnishi, M. Zako and **K. Nishiyabu** 6517 The formulation of homogenization method applied to large deformation problem for composite materials

A. Lara, J. C. Bruch Jr., J. M. Sloss, I. S. Sadek and **S. Adali** 6537 Vibration damping in beams via piezo actuation using optimal boundary control

V. I. Kushch and **A. S. Sangani** 6555 Stress intensity factor and effective stiffness of a solid containing aligned penny-shaped cracks (Discussion)

M. J. Jaffar 6571 Effect of friction on subsurface stresses in sliding line contact of multilayered elastic solids

6577 Keywords

6580 Announcement

NUMBER 45

M. Lucchesi, C. Padovani and **G. Pasquinelli** 6581 Thermodynamics of no-tension materials

S. K. Serkov and **A. B. Movchan** 6605 On crack perturbation in thermoelastic media

S. Mukherjee 6623 CPV and HFP integrals and their applications in the boundary element method

S. Yang and **F.-G. Yuan** 6635 Kinked crack in anisotropic bodies

Q. M. Li and **N. Jones** 6683 Formation of a shear localization in structural elements under transverse dynamic loads

L. Vu-Quoc and **I. K. Ebcioğlu** 6705 Multilayer shells: Geometrically-exact formulation of equations of motion

M. Zingales and **I. Elishakoff** 6739 Localization of the bending response in presence of axial load

A. Zhao and **J. Yu** 6755 The overall elastic moduli of orthotropic composite and description of orthotropic damage of materials

NUMBERS 46–47

STABILITY, STRENGTH AND STIFFNESS IN MATERIALS AND STRUCTURES

W. T. Koiter Commemorative Issue

J. Arbocz, R. de Borst and **E. van der Giessen** 6773 Stability, Strength and Stiffness in Materials and Structures

J. W. Hutchinson and **M. Y. He** 6777 Buckling of cylindrical sandwich shells with metal foam cores

E. Riks 6795 Buckling and post-buckling analysis of stiffened panels in wing box structures

V. Tvergaard and **A. Needleman** 6825 Buckling localization in a cylindrical panel under axial compression

S. Kyriakides and **T. A. Netto** 6843 On the dynamics of propagating buckles in pipelines

I. Elishakoff 6869 Uncertain buckling: its past, present and future

J. Arbocz 6891 The effect of imperfect boundary conditions on the collapse behavior of anisotropic shells

J. P. Fay and **C. R. Steele** 6917 Bending and symmetric pinching of pressurized tubes

M. Bischoff and **E. Ramm** 6933 On the physical significance of higher order kinematic and static variables in a three-dimensional shell formulation

H. de Boer and **F. van Keulen** 6961 Refined semi-analytical design sensitivities

A. Elhage-Hussein, M. Potier-Ferry and **N. Damil** 6981 A numerical continuation method based on Padé approximants

P. Kumar and **S. Pellegrino** 7003 Computation of kinematic paths and bifurcation points

P. Ladevèze, Z. Qian and **J. G. Simmonds** 7029 Computing exact, elastodynamic linear three-dimensional solutions for plates from classical two-dimensional solutions

J. D. Achenbach 7043 Calculation of wave fields using elastodynamic reciprocity

I. V. Simonov and **B. L. Karihaloo** 7055 When does an adhesively bonded interfacial weak zone become the nucleus of a crack?

S. D. Mesarovic and **N. A. Fleck** 7071 Frictionless indentation of dissimilar elastic–plastic spheres

H. Baaser and **D. Gross** 7093 Crack analysis in ductile cylindrical shells using Gurson's model

S. Forest, F. Barbe and **G. Cailletaud** 7105 Cosserat modelling of size effects in the mechanical behaviour of polycrystals and multi-phase materials

L. J. Sluys and **Y. Estrin** 7127 The analysis of shear banding with a dislocation based gradient plasticity model

NUMBERS 48–50

COMPUTATIONAL FAILURE MECHANICS

F. Armero, P. Steinmann, H. L. Schreyer and **K. Willam** 7143 Editorial

M. A. Gutiérrez and **R. De Borst** 7145 Stochastic aspects of localised failure: material and boundary imperfections

J. Dolbow, N. Moës and **T. Belytschko** 7161 Modeling fracture in Mindlin–Reissner plates with the extended finite element method

S. Li, W. Hao and **W. K. Liu** 7185 Mesh-free simulations of shear banding in large deformation

J. Oliver 7207 On the discrete constitutive models induced by strong discontinuity kinematics and continuum constitutive equations

J. Larsson and **R. Larsson** 7231 Finite-element analysis of localization of deformation and fluid pressure in an elastoplastic porous medium

E. Kuhl, **E. Ramm** and **K. Willam** 7259 Failure analysis of elasto-plastic material models on different levels of observation

P. Rahul-Kumar, **A. Jagota**, **S. J. Bennison** and **S. Saigal** 7281 Interfacial failures in a compressive shear strength test of glass/polymer laminates

M. G. A. Tijssens, **E. v. d. Giessen** and **L. J. Sluys** 7307 Simulation of mode I crack growth in polymers by crazing

W. M. Wang and **L. J. Sluys** 7329 Formulation of an implicit algorithm for finite deformation viscoplasticity

A. Carosio, K. Willam and **G. Etse** 7349 On the consistency of viscoplastic formulations

P. Steinmann 7371 Application of material forces to hyperelastostatic fracture mechanics. I. Continuum mechanical setting

W. B. Krätzig, Y. S. Petryna and **F. Stangenberg** 7393 Measures of structural damage for global failure analysis

F. Armero and **S. Oller** 7409 A general framework for continuum damage models. I. Infinitesimal plastic damage models in stress space

F. Armero and **S. Oller** 7437 A general framework for continuum damage models. II. Integration algorithms, with applications to the numerical simulation of porous metals

Z. Chen 7465 Simulating the evolution of localization based on the diffusion of damage

T. Svedberg and **K. Runesson** 7481 An adaptive finite element algorithm for gradient theory of plasticity with coupling to damage

A. Rodríguez-Ferran and **A. Huerta** 7501 Error estimation and adaptivity for nonlocal damage models

7529 Keywords

NUMBER 51

W. Wang, C.-T. T. Hsu and **D. Blackmore** 7533 Generalized formulation for strip yielding model with variable cohesion and its analytical solutions

Y. Li, K. T. Ramesh and **E. S. C. Chin** 7547 The compressive viscoplastic response of an A359/SiC_p metal–matrix composite and of the A359 aluminum alloy matrix

S. C. Lin 7563 Buckling failure analysis of random composite laminates subjected to random loads

M. Epstein and **M. de León** 7577 Homogeneity without uniformity: towards a mathematical theory of functionally graded materials

Y. Y. Yang 7593 Time-dependent stress analysis in functionally graded materials

N. Tutuncu 7609 Effect of anisotropy on inertio-elastic instability of rotating disks

Z. Li, W. Guo and **Z. Kuang** 7617 Three-dimensional elastic stress fields near notches in finite thickness plates

S. Mukherjee, M. K. Chati and **X. Shi** 7633 Evaluation of nearly singular integrals in boundary element contour and node methods for three-dimensional linear elasticity

A. C. J. Luo 7655 An approximate theory for geometrically nonlinear thin plates

F.-L. Liu 7671 Static analysis of thick rectangular laminated plates: three-dimensional elasticity solutions via differential quadrature element method

NUMBER 52

K. M. Liew and **B. Yang** 7689 Elasticity solutions for free vibrations of annular plates from three-dimensional analysis

H. Zhu, C. S. Chang and **K. A. Lou** 7703 2-D Normal compliances for elastic and visco-elastic binder contact with finite particle size effect

W.-Y. Tian and **Y.-H. Chen** 7717 A semi-infinite interface crack interacting with subinterface matrix cracks in dissimilar anisotropic materials. I. Fundamental formulations and the *J*-integral analysis

Y.-H. Chen and **W.-Y. Tian** 7731 A semi-infinite interface crack interacting with subinterface matrix cracks in dissimilar anisotropic materials. II. Numerical results and discussion

W.-Y. Tian and **Y.-H. Chen** 7743 Interaction between an interface crack and subinterface microcracks in metal/piezoelectric bimaterials

P. D. Chinh 7759 Differential nonhomogeneous models for elastic randomly cracked solids

C. Chen and **T. J. Lu** 7769 A phenomenological framework of constitutive modelling for incompressible and compressible elastoplastic solids

C. Padovani 7787 On a class of non-linear elastic materials

L. H. You, Y. Y. Tang, J. J. Zhang and C.Y. Zheng 7809 Numerical analysis of elastic–plastic rotating disks with arbitrary variable thickness and density

V. M. Levin, M. I. Rakovskaja and W. S. Kreher 7821 Erratum to "The effective thermoelectroelastic properties of microinhomogeneous materials" [International Journal of Solids and Structures 36 (1999) 2683–2705]

I Volume Contents and Author Index, Vol. 37, 2000